

## ENDURING VALUES IN EDUCATION

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FIRST OF ALL, I must express my deep appreciation of your exceeding courtesy and goodwill in inviting me to be your speaker on this Alumni lecture program. A university has been described as a society of scholars, as a teaching institution, and as a center of research. But in a real sense it is also represented by its body of alumni. Rice is a living reality here on this campus, but Rice also lives on in the homes and offices of everyone of you Alumni, in the ideas and projects which make your lives significant. Our city, our state, our nation are better because of you, and through you, because of Rice and of the sort of education with which Rice is identified.

The lectures in this Alumni series may well follow different lines. Our various speakers will be bringing to our attention ideas and problems in their respective specialties, and that will be very interesting intellectual discussion. In my own case, the desirable choice has seemed somewhat different. After teaching philosophy for more than forty years and retiring from active service in 1956, I have been recalled to Rice and am now teaching two courses dealing with the broad development of ideas in our civilization. In this work I have been ranging over a wide field of inquiry, and, as you

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may readily see, I have been impressed by my need of right selection in making the right distribution of emphasis, and so I am reconsidering my scale of educational values. What is there in university education that really counts across our lifetime? This is my problem, and is it not also yours? You also, in your various social and professional activities, must be reviewing in your minds the studies which you have pursued, the ideas to which you have been introduced. Some of them, some of those studies have had their practical and professional value in advancing your careers, and I know that in the case of so many of you this has been very substantial. Perhaps a few of those past classes, however, as you now look back upon them, seem rather routine and inconsiderable. But others have somehow gripped your minds through the years, have affected your entire outlook on the world, have been to you sources of significant and enjoyable experience. As we thus share our educational memories, we may find that some of us have had more of these choice educational values than others. As we help to plan for the education of our children and maybe even of our grandchildren, do we not hope that they will also enjoy some of our fine studies, or else that in their turn they may get out of college some things which we regret that we ourselves missed?

My talk tonight, as you already observe, will not be a learned lecture about any special topic but just a plain discussion of what I have called enduring values in education. I do not say magisterially "*the* enduring values," for I can only hope to call your attention to some of them. Having stated plainly the purpose of my discourse, I also give you my text. It is a line from the Roman poet Terence: "I am a man, and nothing which concerns men is alien to me." So I should say that whatever special study we may be pursuing, we should get from it some clearer view of the ongoing march of ideas in our civilization, the epic of man's agelong struggle to make sense of the world in which he lives, of his

place and role in the world-drama, and of his own relations to others.

This natural but also humane outlook, this integrative action in our thinking, I should say, is of prime and ultimate importance in all our studies. In my view, it is the very heart of education. We all require knowledge of nature, and we seek to apply that knowledge of the resources of nature for human use and advantage. But we also have a great need of understanding human nature, to understand ourselves more fully, if we are to pursue with intelligence a thoroughly satisfactory life in our personal experience and in our social relations. This is the general purpose of deepening and expanding our intelligence. Education should be a liberating process, the freeing or emancipation of our minds from shallowness and from narrowness. Our education should open the windows and doors of our minds to the expanding vistas and fields of a really significant life.

I must at this point express a protest against the rigid distinction which is often made between the sciences and the humanities. No education is truly liberal or fully humane unless it includes some trained insight into the world of nature in which we men and women live, unless it includes some good understanding of science and scientific methods. No matter on what special field of the so-called humanities we may concentrate, all of us should become at least naturalized citizens of the realm of scientific work; otherwise, we are bound to feel ourselves alien in the world of modern thought and modern life.

What have been the characteristic marks of the modern reconstruction of scientific methods and of basic outlook on nature? I cannot pretend to add a single word to Dr. Houston's brilliant discussion of this subject which inaugurated this series of Alumni lectures. But may I call attention to the educational significance of the type of thinking which is required for scientific advance? This thinking is distinguished by careful and minute observation of the facts, by controlled

experimental precision in the testing of proposed explanations, and by perfected mathematical analysis and formulation of theories and laws. The modern scientist resists wholesale speculation about nature, but he also is not satisfied with merely piling up a mass of detailed observations and data. He insists on getting the particular facts, but he also seeks to organize his knowledge of them into some consistent rational theory. May I use a comparison here? The traditional dogmatist has been compared to a spider spinning his web of speculations out of his own mind. The random observer is like an ant, piling up crumbs and grains of factual details without any system. But the really productive mind of science is like a bee which gathers pollen and nectar and then turns them into honey.

The productive interplay of observation and hypothesis, experiment and rational analysis, has expanded our knowledge of the order and the laws of nature in every department of scientific examination. In three or four centuries our modern civilization has made far greater advance than in all the preceding ages of recorded history. The progress in the pure sciences has been paralleled by practical advance in the application of scientific knowledge in the various branches of engineering, in industry, in agriculture, in medicine.

Note at this point two important characteristics of the scientific method. On the one hand, it is specific and particular in its observation and collection of data. The modern scientist does not observe or experiment in general. He concentrates his inquiries on a particular field of nature. Specialization in definite research is essential to scientific mastery. The scientist chooses his field: he observes the processes of bodies at low temperatures; he analyzes the properties of coal tar; he traces the genetics of fruit flies.

But observe, on the other hand, what is required for the fuller scientific understanding of particular facts. In every case there must be traced and established certain relations and causal connections of particulars into a more general

and comprehensive insight. If the scientist's observation of a variety of particular data is to yield real understanding, it should lead him, through experiment and interpretation, to the recognition of some system of facts, some causal pattern which he can formulate. The initial knowledge may be particular and specialized, but the scientific process must advance to some theoretical organization. We come to a real grasp of some particular process and detail only as we see it in some system of relations. Scientific research may be particular in the beginning, but it can realize itself only in some significant system. Note, then, in what a convincing way scientific work itself manifests the supreme educational value of systematic intelligence. The study of nature points to ever larger and more expansive theoretical organization of interpreted facts.

But now let us consider another inference which is also very significant. All along the line, the scientist, young or old, who is investigating nature must sooner or later reflect on his own activity as a scientist. There he is, working with physical things and processes, but again there is *he*, engaged in intellectual activities. How are these intellectual activities, how are *they* to be understood and correlated with the physical processes in his overall cosmic view of the world? Science deals with physical material, but science itself is not physical; it is intellectual and logical. When you use the word "therefore," when you point out that a certain conclusion or law "follows *from*" certain evidence, you are not stating anything physical. You are speaking *about* physical matters, but you are using logic. A conclusion is not a physical sequent; it is a logical consequent. Science, that is scientific thought itself, is the outstanding proof that there is more to reality than the physical processes with which science is concerned. And mathematics itself, the essential medium of scientific formulation, how could mathematics be included in a merely mechanistic view of the world?

You see here how we are led from physical science to the

recognition of what we call the humanities. Man that seeks to understand physical nature must also try to understand himself, his own intelligence and character. And he must also recognize the values which he pursues and in which he seeks to realize and perfect the significance and worth of his life.

The recognition of this larger truth in education is essential to the development of a fully cultivated mind. This principle applies to all of us, students, alumni, professors. We are all in need of continuing expansion of our cultural horizon and of what I may call humane integration of our ways of thought. We all need versatility and fruitful response to the various significant outlooks on the world. The various so-called departments into which we divide conveniently our university programs of studies are of course distinguishable, but they are also related. They must all, each one in its own way, contribute to the productive integrity of the mind. This should be a guiding aim in our studies, and it must also be a directive principle in our teaching. May I consider some illustrations of it?

Start first with mathematics. Many students, and perhaps some of you in this hall, have an aversion to mathematics as a very specialized dry and abstract subject, and this academic phobia is transmitted from one college generation to another. But mathematics can be taught and studied so as to reveal its inner logic, the laws of order, implication, and consistency which the mind must respect and which are the conditions of intellectual advance. We recognize mathematics as essential to the formulation of scientific principles. Plato in classical antiquity acknowledged its philosophical importance by his insistence upon an understanding of geometry as a requirement for admission to his Academy. And mathematicians have also pointed out some interesting kinships of their thought with poetry and art. Weierstrass said that "a mathematician who is not somewhat of a poet will never be a perfect mathematician." Poincaré even more defi-



nately declared that in the formulation of great mathematical and scientific theories there is a creative process analogous to artistic invention, an alert responsiveness of the mind to order and harmony. Poincaré called it "a feeling of mathematical beauty." A similar view is expressed by the very distinguished French member of our Rice Department of Mathematics, Dr. Mandelbrojt of the Collège de France: "To be interesting, a mathematical fact should be first of all, beautiful. A theorem can be, and should be, beautiful like a poem." You see what mathematics can be to those who are real masters of it, and some of this insight and choice experience can and should come to you and to me. I may call it the choice experience of intellectual imagination.

In turning to some other studies on our university programs, many of us may be on more familiar ground, and we shall see the operation of the same principle of intellectual synthesis. The study of literature must of course have its own scholarly discipline, if it is to lead us to thorough appreciation of its values. It is like the mastery of a musical instrument which has as its prerequisites finger exercises and much elaborate technique. But our study of literature should not stop there. Students should not be disheartened by literary techniques and precisely in literature classrooms lose any love which they may have for literature. Beyond the learning of names and dates and titles and the spotting of passages, there must somehow be imparted the magical enchantment of sheer beauty, of the great lines that grip our souls and sing themselves in our ears, the utterance of the greatest experiences of the greatest minds of which Shelley wrote, literature as the choicest expression and criticism of life, allowing us to share in the finest moments of genius. We can live without poetry, that is, we can exist, but not nearly so well.

Likewise with history and the social sciences. History has been defined by a great historian, Jakob Burckhardt, as "what one age finds worthy of record in another." It also

has its technique and special discipline, but here also the productive mind must advance from even the most accurate collection of documented details to some interpretation which enkindles them with significance. As we have been told, history is not the correct record of all the telegraph poles which stretch across the desert of Gobi, but the reading of some message that goes over the wires. Note here the emphasis on documented objectivity in the recording of events, as they actually took place, and on the other hand the interpretative grasp by the creative insight of the great historian: not as an ant with its crumbs but as a bee with its pollen. So said the distinguished English social historian, George Trevelyan: History is "imagination pursuing the fact and fastening upon it. . . . Let the science and the research of the historian find the fact, and let his imagination and art make clear its significance." Where sound scholarship together with imaginative insight have thus produced a great historical work, we who may not be historians but who are eager readers of history, we can be led to a living appreciation: we not only learn the record of events but grasp and feel their inner character and significance. A history of that sort is both a scholarly product and an artistic achievement. It is a re-enactment of the human drama.

Social studies and psychology are not so far apart from the natural sciences as they may seem. We should be led to understand the full human and social meaning of the modern industrial revolution. Our modern scientific and technical advance is not by itself an assured gain in human values. We have increased to an incredible degree our potential in tapping the incalculable resources of nature, but whether these new powers are or are not used for greater human welfare depends upon our choice of values. Upon that choice hangs our whole modern destiny — of unprecedented progressive achievement, or of utter disastrous ruin.

All along the line I have been trying to express a dual truth. We must recognize the importance of competent spe-



cialized knowledge, but also the importance of correlating our knowledge of various fields into some significant integration. Expanding knowledge manifests itself as not provincial but a commonwealth. Another growing conviction must be impressed on our specialists: no one set of postulates can exhaust or do justice to the vast complexity of nature. Nature has neither top nor bottom. Two lines from *Hamlet* come to our mind here:

There are more things in heaven and earth, Horatio,  
Than are dreamt of in your philosophy.

This so-called "Hamlet principle" is in operation in our discussion. There is more in nature than is dreamt of in any one set of abstractions. We should recognize the need for a critical comparison of fundamental principles and for some ultimate synthesis.

We have been considering the importance of avoiding too narrow and exclusive specialization, of expanding our mental outlook by a variety of studies. Thus I may venture to make a specific suggestion regarding our university programs. We distinguish two groups of students: those who specialize in science and engineering and those who have some major in the humanities. This distinction is sound, but the two groups that are so distinguished should not remain alien to each other. They need mutual introduction. Would it not be desirable to have a senior course for all humanities majors which would deal with the history of science and the basic principles of scientific methods, and likewise a senior course for all science and engineering majors which would survey historically and systematically the leading ideas and methods of humanistic studies? Two such courses would help to weave together the whole texture of undergraduate education and emphasize the cultural integrity of our university.

May we now consider not so much contents but methods of study. How are we to proceed in our intellectual training? We have said that the right kind of education has two main

aspects. It should aim at thoroughness in one's specialty but also at breadth of intellectual outlook. It should always be pursuing the ideal of an integral whole of significant parts. Truly educated thinking is dynamic, and likewise in two ways: through better mastery of the parts and better organization of the whole.

One important way of realizing these goals is by cultivating what I should like to call theoretical alertness. By theoretical alertness I mean a state of mind that goes beyond routine factual perception. The mind should record accurately its observed data, but it should be more than a recording apparatus. Of its every idea it should ask, not only the immediate questions, What and How, but also the more exploring inquiries: Why? or at any rate, Whence and Whither? And in determining its degree of concern with any idea, the mind should ask, What of it? If any experience of ours is to yield significant understanding, we should ever be engaged in entertaining some explanatory pattern of relevance and implication which should somehow relate that experience, that fact, to others in some theoretical coherence. Beyond passive reception, no matter how precise, our mind must develop its active response to its data. This interpretation should not be premature or dogmatic, but, if it is both alert and critical, it may lead us in our thinking beyond factual passivity to penetrative and expansive understanding.

The theoretical alertness of which I speak manifests itself mainly in our intellectual work, but it is not a merely intellectual activity. It is a manifestation, in greater or lesser degree, of what is sometimes called creative intelligence, and what we more commonly recognize as imaginative reach and grasp. Much as productive scientific theory and technical invention may differ from great poetry or the other fine arts, they all share this creative power of imagination. In intellectual work this power goes beyond skillful management of details and patient or no matter how competent classification. While firmly grounded in its facts, it reaches

beyond them to fructify them in some theoretical pattern of larger understanding. Across the line, in the humanities, in literature, history, or philosophy, this is the insight and expression which distinguishes the merely workmanlike scholar from the creative interpreter who grasps and expresses the great ideas.

We should be always clearly aware of this important function of the creative imagination; we should cherish it and nourish it in ourselves and in others. Aristotle called it the gift for metaphor, for the recognition of similarity in dissimilars, and declared that it is the surest mark of genius; but he observed discouragingly that it cannot be taught. Be it taught or be it aroused and inspired, it marks the high ascents of intelligence to its summits. Here is Newton, seeing apples fall in his garden, and leaping forward to contemplate the revolutions of the stars in their orbits and to formulate his law of gravitation. Here is Darwin, reading Malthus' essay on the restriction of population growth by the limited supply of food and other conditions of subsistence, and grasping his cosmic theory of evolution. And there are also a hundred poets and artists who, in the words of Robert Browning, out of three sounds make, not a fourth sound, but a star. Imagination of this sort is not wholly limited to any one kind of mental activity, nor is it to be regarded as a separate mental capacity. Rather should we recognize that when the mind attains its plenitude and consummation, rational thinking and creative imagination manifest mutuality, stimulate and enhance each other. So Wordsworth teaches us in a passage of inspired poetry:

This spiritual Love acts not nor can exist  
Without Imagination, which, in truth,  
Is but another name for absolute power  
And clearest insight, amplitude of mind,  
And Reason in her most exalted mood.

Is there a better way to gain an understanding of the vast range and abundance of creative intelligence than to study

it in the minds and careers of men of genius? To enter intimately into the life and work of a real master is to grasp vitally some of the principles of mastery; its principles and perplexities, and its final amazing mystery. A superlative mind of this sort, while thoroughly unique, also reflects or rather lights up the whole epoch or culture to which it belongs. Where else can we trace better the medieval scene than in the great vision of Dante; and where can we read the life of the Renaissance more thoroughly than in the *Note Books* of Leonardo da Vinci? Who can show us the victory but also the tragedy of genius more overwhelmingly than Beethoven, dreading the loss of his most needed sense, yet despite his deafness creating the greatest masterpieces of his chosen art? And likewise on the heights of scientific achievement, as the careers of Galileo and Darwin and Pasteur illustrate. It has seemed to me that our college studies would be enriched if we should put more emphasis on the biographical, living personal note in considering the great thinkers whom we study.

You notice that I seem content to cite the consummate masters, for a first principle in our education should be a judgment of relative importance or, as I should prefer to call it, value priority. Of course, one need not be altogether rigid and ignore everything except the greatest classics. But is it not a good general rule to prefer reading from the top? This problem largely takes care of itself, in one's reading and in one's thinking: if one has come to know and cherish superlative work, then second-rate or incompetent substitutes lose their appeal. And the surest way to learn why Sophocles and Dante and Shakespeare and Goethe are accounted classics is just to read them. The same test will serve in science or history or philosophy. One great value of gaining intimacy with the great classics is that it gives us a standard or scale of values which enables us to judge more fairly the good though not masterly writers of various periods and of our own time, whom we should not neglect.

Now we may interpose at this point to remark: How does all this discussion of great geniuses affect the direction of our intelligence? You and I shall never write a *Divine Comedy* or compose a *Ninth Symphony*. All the same, does not basic principle abide? The creative intelligence which the supreme genius expresses in seemingly incomparable perfection is a quality of our minds also, no matter how infrequently or in how small a degree. Ours is always the opportunity and the choice to fan the tiny spark into a flame. Educational growth is the spiritual fulfillment of ourselves, as far as that is possible for us. The sublime appeal of religion is similar, as we may read it in the Sermon on the Mount: "You must be perfect, as your heavenly Father is perfect." This does not mean that we should aspire to divinity, but that our own human spirit should strive for consummation.

We err when we tend to exalt the higher values of life so that they seem quite apart from the experiences of our everyday affairs. I may call this the holiday view of culture; it is artificial and wholly astray. True culture is not superimposed artistic decoration of an otherwise drab and downright common existence. Culture is the living penetration of all our interests and activities by the values of our higher spiritual life, intellectual, artistic, moral, religious. Here I offer you a definition of culture: it is daily living, made significant. If it is genuine, it is not exceptional. That is what distinguishes true courtesy from an only occasional display of fine manners, and steady rationality from an infrequently reasonable reaction, and a life-pervading aesthetic taste from a gala artistic splurge, and genuine religious devotion from a merely dressed-up Sunday morning piety. Our education should not be a mere garnishing but a thorough possession of all the higher values that are within our reach.

Put this basic principle to work in all the activities of our educational process. A good college education teaches us some of these truths and values in our classes, but even more abiding will be our possession of them if we learn them also

on our own. And this is another enduring value which we should seek to develop, the value of intelligent initiative. Few things are as important as the cultivation of the ability to read valuably on our own initiative, not in the completion of a class assignment. I remember a Rice student of fine promise but very limited means, who had to work long hours to earn his expenses. He received a substantial scholarship, and the next year I asked him what outside work he was doing. He replied that he had been studying by himself three volumes of Faraday's researches. That student is now one of the most distinguished scientists among the Rice alumni, so distinguished that I am half certain you will guess his name.

Some of this fine reading we can do by borrowing books from the university library. But much of it, especially great poetry, is read most rewardingly at the right time, when as we say we just feel like it. And that is the one and conclusive reason for book collecting, for acquiring our own library. Our rooms come alive with ever present sources of high enjoyment when we line their walls with our cherished books, like good friends ready for choice conversation. So said Montaigne: "In whatever language my books speak to me, I always speak to them in my own."

Really fruitful reading must always have much of this quality of conversation, not only listening to our author but also talking to him and his book. One great peril to the likely growth of intelligence in our society is the multiplication of mechanical media of information and entertainment to which we are apt to react passively, react without responding. Look at the faces of some people as they watch a television show, the gaping, silent mouths and often still more silent minds, just taking it all in like so much blotting paper. Where people can be thus entertained without any active participation of their own, the mind is dormant and inactive, and one can remain stupid without finding it dull.

The value of developed intelligent initiative which makes



us fruitful explorers of new fields of high enjoyment is really the value of expanding our own significance to ourselves. Of course, we shall all agree that our personality grows in a variety of social relations and involvements, but is it not also true that the most significant and valued social colleagues and companions are those who have, besides their social gifts, their own intimate and individual unique life? The Gospel counsels us to pray in our own upper chamber; even so in the other experiences of our higher life, we must in a real sense enter into our own inner being, become significant to ourselves, become our own most intimate and welcome company.

Much, perhaps most of our work is done in collaboration with others, and a considerable part of enjoyed leisure is also sociable and socially shared. But as the years roll along, all of us, alumni or professors, find that we are increasingly thrown upon our own resources. Eventually, when the time of retirement comes, men realize that their entire days are going to be largely days of leisure. It is then that the true worth of our year-long education will be determined: have we learned and practiced the wisdom of expanding our own inner resources that are to sustain us in our old age—or have we become utterly tedious to ourselves? That, as I take it, is the universal problem of the aging in our society. Of course, there are other problems. For many men and women of advanced years, there is the problem of grievously needed medical care which they cannot procure for themselves; and many more lack the material means of decent subsistence. But for all, healthy or ailing, materially indigent or not, for all of us the problem of mastering deadly boredom is the problem of whether we have or have not developed through the years mental interests and capacities which can be our refuge in the evening years of our lives. And that is where the enduring value of our education will be most severely tested.

I am nearing the end of my hour with you, but I should

like to consider one more value of importance in the social relations of minds, especially in the present age of conflicting ideas and policies. We spoke of the value of our active response to the ideas which are presented to us. But there is another aspect of this response which should not be overlooked. While we should follow the counsel of Montaigne and Emerson and should talk with our books, we should not merely and brashly talk at them. As with books, so in our converse with others, and so in our dealing with ideas generally. An essential part of the art of fruitful discussion is the capacity for attentive and fair listening. Before I can even begin to answer, I must first really hear the question.

This training of our minds that cultivates fair exchange of ideas in reading, in conversation, in criticism, in controversy, the importance of this training should be kept in mind in considering the right methods of lecturing and taking notes and of class discussions and preparations of essays and of the conduct of tests and examinations. They all play their part in the formation of our mental habits and set the tone of our thinking. A soundly critical mind is not limited to passive receptivity, but it is not averse to attentive reception. It does not merely listen, but it does listen before replying.

How are we to find and to maintain this golden mean between supine mental receptivity and equally uncritical or unyielding resistance? Whether it be in the purely intellectual contention of ideas, or in the arena of political and other conflicts of our social system, a mind of really cultivated intelligence must be able to deal with opposing views and policies fairly. Before any ideas, our own or those of others, are accepted or rejected, they should have their good day in a fair court of private reflection or public discussion. Without that reasonable trial, neither acceptance nor rejection is of any real worth. We should not wish either to win or to lose merely by default. We seek the truth, and we mean to abide by whatever turns out to be the truth, and therefore we should not resist criticism but welcome it. We say

that democracy is a two-way road, and, if we really believe it, we should keep the lanes of free discussion open and we must not jam the traffic.

My last point is evident; you already recognize it, and I shall only state it in a closing word. An acid test of the enduring value of our education is this, whether it has been free, liberal, and liberating. This is one fundamental reason for our devotion to what we call academic freedom. It is more than merely academic. All of us, students, professors, and alumni, all of us who are heirs of our American democratic tradition of freedom of thought, we must ever cherish and nourish in our minds the freest interplay of ideas, for out of that free interplay alone the greater truth and the better policy can eventually be realized. The charter of true education and the seal of its enduring value may be read in the words of the Apostle so wisely engraved on the Main Building of our State University: "Ye shall know the truth, and the truth shall make you free."